



VII B. The Development of the GLAST Standard Analysis Environment (SAE)

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Overview of the SAE

- GSSC is required to provide GIs with analysis software
 - FRD § 5.3.3.2
- Software is being developed jointly with the LAT team
 - LAT team is managing the SAE development (S. Digel)
 - Code architecture shared (T. Burnett - LAT, J. Peachey - GSSC)
- FRD requirement: one software suite to support two communities
 - Astrophysics: tool set, executables, Ftools
 - High energy physics: tool kit, libraries



Overview of the SAE, continued

- Existing tools used when possible and appropriate
 - ds9, fv, Root for visualization
 - HEADAS (Ftools) libraries and basic utilities
 - Xspec for spectral model fitting
 - axBary (multi-mission, from the Chandra software) for barycentering
- Support for standard tools even if a new tool is required as part of the SAE
 - File formats conform to HEASARC standards
 - Some analysis can and has been done with existing tools
- RFA #2: Supported platforms
 - Development will occur simultaneously on Linux and Windows
 - Code will be ISO standard compliant
 - Trial ports to other Unix platforms will be performed periodically to identify portability issues as the code is developed
 - Full support of the same platforms as Ftools will be achieved prior to the first public release of the software



Definition of the SAE

- Composition and high level design agreed upon by joint LAT-GSSC Software Working Group
 - Described in detail during the November, 2003 review
 - Current version of requirements may be found at <http://www-glast.slac.stanford.edu/ScienceTools/slwg/SAE/default.htm>
- Constraints on the GLAST mission require some custom software
 - GLAST usually will operate in survey mode: each event has a distinct response function
 - Difficulties manipulating and analyzing data which require some sophistication
 - wide PSF at low energies
 - low count rate regime
 - large field of view



Milestones to Guide Development

- Data Challenges and Launch used to define release points
 - Data Challenge 1 (DC 1) was December 2003 - March 2004
 - Parts of SAE were implemented, mainly in prototype form
 - Additional existing software (Root, Ftools etc.) used
 - Result was better understanding of the needed functionality
 - Data Challenge 2 (DC 2) will be February 2005 - May 2005
 - A majority of the SAE will be implemented in mature, albeit incomplete form
 - Goal is to be able to perform particular analysis tracks completely within the SAE
 - Results may suggest refinements to the SAE definition and/or design
 - Data Challenge 3 (DC 3) is planned for Spring, 2006
 - Goal is to have all parts of the SAE implemented, though some functionality will still be missing
 - Should be considered “beta” release for first public release
 - Launch February 2007
 - Freeze for first public release will start at the end of November 2006



Results of DC 1

- Purpose of DC 1 with respect to the SAE was mainly to provide feedback on the definition of the SAE
- DC 1 activities underscored critical aspects:
 - **Integration and system testing**
 - LAT team improving integration, developing installation scripts, etc.
 - Testing integrated into development process
 - **Data visualization**
 - Existing tools given better visibility
 - Development of SAE graphical tools accelerated
 - **Documentation**
 - LAT devoting resources to improve this
- After DC 1 the GSSC undertook a study, in which members performed analyses of DC 1 simulated data with existing software tools
 - **Served as independent validation of the SAE definition**
 - **Provided more concrete understanding of the SAE requirements**



Long-term SAE Development Schedule

	DC1	DC2	DC3	Launch
Likelihood Analysis	Unbinned analysis	Some binned analysis	Full binned, unbinned analyses	Refinements and integration
Pulsar Analysis	-	Write timing info, basic period search	Full period search	Refinements and integration
GRB Analysis	Prototypes	Support for standard analysis	Advanced multi-dimensional analysis	Refinements and integration
Catalog Analysis	-	Framework and common cats, bkgnd model	All required catalogs, refinements	Refinements and integration
Obs Simulation	Simple sources, bursts	Pulsars, AGN	Refinements	Refinements and integration
User Interface	-	Basic data visualization, basic GUIs	Scripting, advanced visual/GUIs	Refinements and integration
General Utilities	Common database access	More DB access, data selection	Refinements	Refinements and integration

Functional Group



GSSC Approach

- Timeline handled in six-week development cycles, or “builds”
- There will be four such builds, followed by a six week testing and integration period, prior to DC 2
- Schedule specifies which SAE software components will be developed during each build
- Each build begins by setting out well-defined functional goals for that build
- Responsibility for specific tasks is then delegated to individual developers
- Tests verifying the functionality are developed *first*, thus establishing metrics by which progress may be measured
- Within the build, the minimum code necessary to meet the metrics is being developed



Conclusion

- The LAT and GSSC are working together closely to produce the SAE
- Formal requirements for the software have been defined
- A realistic development schedule which meets these requirements has been created and is being followed